

I would particularly call attention to the third and fourth measurements, as also to the last two, and venture to think that no one could entertain the trustworthiness of data that involve such great changes in cranial capacity in such short spaces of time. To what, then, are these differences due? Partly, of course, to unavoidable errors of observation. This, however, I think is only a small portion of the differences. The main difference is, I believe, due to other causes. Anyone who has seen the instruments will recognize that they are far too rough and imperfect to measure small differences with any degree of accuracy, and yet it is on differences as small as one-tenth of an inch that Mr. Galton's calculations are based.

I admit it is quite possible that, even after elimination of the errors due to experimental causes and to the imperfection of the instrument, the figures would still be somewhat variable. These variations may, however, be readily explained, without the assumption of any improbable head-growth. The amount of hair on the head must considerably influence the measurements, and, according as it is long or short at the time of measurement, so will the figures show an increase or a decrease. I have tested this, and proved it to be the case. On August 30 (my hair not being very long, having been cut two and a half weeks previously) my head was measured, the figures being as follows:—

$$5.8, 7.4, 5.6 = 240.35.$$

I then had my hair cut fairly short, and was measured again; the figures then read—

$$5.7, 7.4, 5.5 = 231.99.$$

Again, the scalp being, as is well known, very vascular, any change in the fulness of its vessels must materially affect the thickness of the scalp, and so influence the measurements, and so any cause producing either increased blood-flow or hindering the return of blood from the scalp, will have some effect on the measurements.

Several other similar explanations of supposed head-growth might be given, but I think the measurements I have given will suffice to show the uselessness of the measurements for calculating head-growth, and, further, that such differences as actually do exist can be readily explained without having recourse to any such improbable assumption as the further growth of the head after nineteen years of age, and without involving the unintelligible statement that the head of a "poll" man grows more than the head of an honour man. This would necessitate the supposition that a "poll" man, by his three years' study (?) at Cambridge, profits more than an honour man! Such an hypothesis would need more scientific proof than has been given.

Trinity College, Cambridge, September 3. H. J. P.

Glories.

COLOURED rings are often seen surrounding the shadow of the spectator's head when the sun is shining on a fog of water particles. They are known by various names, such as glories, anthelia, Ulloa's rings, &c. Can any of your readers inform me if they can also be seen when the fog is frozen? I should also be glad of accurate accounts of their colour and angular dimensions. I have read those given by Scoresby (Kaemtz, "Meteorology," translated by Walker); Flammarion (Glaisher's "Travels in the Air"); Abercromby (*Phil. Mag.*, January 1887); and Molin (*NATURE*, February 1888).

JAMES C. MCCONNELL.

Hotel Buol, Davos, Switzerland.

Fine Slow-moving Meteor.

ON September 25, at 8h. 5m., I saw a bright first-magnitude meteor amongst the stars of Aquarius. It moved very slowly to the east, and, after a duration of about 13 seconds, disappeared at the point R.A. 11° , Decl. $+8^{\circ}$. Its place of first appearance was near R.A. 332° , Decl. $-7\frac{1}{2}^{\circ}$, so that the length of its observed path was about 42° . The nucleus was followed by a thick train of sparks, and at the end it divided into two parts. This meteor was observed at Oxford by Mr. W. H. Robinson, of the Radcliffe Observatory. He writes:—"This evening a fine meteor was seen slowly moving between the constellations Aquarius and Pegasus, at 8h. 5½m. G.M.T. It was first seen at R.A. 330° , N.P.D. 88° , disappearing near R.A. 352° , N.P.D. 82° ; duration, 3 or 4 seconds." A comparison of these observations shows that the radiant point was probably in R.A. 244° ,

Decl. -22° , and that the meteor, when first seen, was at a height of 46 miles over a point in the English Channel 20 miles south of the Isle of Wight. It disappeared near Staplehurst, in Kent, at the same height. Length of path, 100 miles. At Oxford, the early part of the meteor's flight was not seen. The Bristol observer watched the meteor through 91 miles of its course, and the duration of 13 seconds would give a velocity of 7 miles per second. At Oxford, 35 miles of the terminal section of the flight was seen in 3 or 4 seconds, which gives a velocity of 10 miles per second.

Further observations of this body would be valuable to corroborate these results. The meteor was an exceptional one, both as regards its slow speed and the position of its radiant point. No meteor-shower has hitherto been recognized at this epoch in the region of Scorpio. Isolated slow-moving meteors of this description are of great value as giving us indications of feeble systems not otherwise discoverable, and as allowing good determinations to be made of their heights and velocities.

Bristol, October 4.

W. F. DENNING.

A Brilliant Meteor.

AT 7h. 6m. ± p.m. G.M.T., on October 10, a brilliant meteor was observed here, about 10° south-west of α Pegasi, and travelling from thence to near Jupiter, being apparently three times the size and brilliancy of that planet. Its colour was of a bluish-white, and it possessed a fine train, disappearing after six seconds, having burst into a number of pieces.

W. HUGO.

Kew Observatory, Richmond.

The Shining Night-Clouds—An Appeal for Observations.

THE following is the substance of an appeal for observations made by Herr O. Jesse in the spring. The time of year in which the clouds appear in these latitudes has now elapsed; I have seen no sign of them this summer, either in this country or while travelling in the Alps. But as Mr. D. J. Rowan saw them (see *NATURE*, June 13, p. 151) it is very desirable that they should be looked for in all parts of the world. I see Mr. Le Conte assumes (October 3, p. 544) that Mr. Rowan is correct in calling these clouds self-luminous—which conclusion I agree with Herr Jesse in considering highly improbable.

Sunderland, October 12.

T. W. BACKHOUSE.

The time of year has again arrived when the lustrous silvery clouds, which have appeared annually in June and July from 1885 to 1888, may be expected to again become visible to observers throughout Europe.

These clouds are not only of high meteorological interest, but may be of an almost greater astronomical one; for, from their so decidedly pronounced periodicity, joined to their extraordinary height, it may perhaps be inferred that they are of extra-terrestrial origin.

As there is entire lack of previous record of these clouds, and they may disappear soon for an indefinite period, I would earnestly ask for such early observations as may be likely to determine their origin, nature, and periodic motion. Spectroscopic examination of their light would be valuable. Prof. Galle and others have considered that the clouds in question are phosphorescent, but this is very improbable, and I hold they are scarcely, if at all, visible unless the sun shines directly upon their substance. On this assumption, their height in 1885 was found to be from 49 to 54 kilometres; but, by photographic observations in 1888, it came out as great as 75 kilometres.

Prof. Kohlrausch advances the opinion that these clouds have in some way been formed by the eruption of Krakatã, although they were not generally seen until nearly two years after that event. From this hypothesis I suggest that they may be caused by the condensation of gases from that volcano, and that the process of condensation occupied the intervening time. One observer, however, states that he saw them in 1884.

NOTES.

WE deeply regret to have to record the death of James Prescott Joule, one of the greatest men of the age. He died on Friday last at his residence at Sale, near Manchester.

PROF. H. G. SEELEY, who has recently returned from an expedition to South Africa, has obtained from the Karroo, among a large number of other treasures, a complete specimen of the much-discussed *Paricasaurus*.

THE ordinary general meeting of the Institution of Mechanical Engineers will be held on Wednesday, October 30, and Thursday, October 31, at 25 Great George Street, Westminster. The chair will be taken at half-past seven p.m., on each evening, by the President, Mr. Charles Cochrane. The following papers will be read and discussed, as far as time permits:—On the results of blast-furnace practice with lime instead of limestone as flux, by the President; description of a rotary machine for making block-bottomed paper bags, by Mr. Job Duerden, of Burnley, communicated through Mr. Henry Chapman; further experiments on condensation and re-evaporation of steam in a jacketed cylinder, by Major Thomas English, R.E., Superintendent, Royal Carriage Department, Woolwich.

THE Government of Victoria has definitely deputed Mr. James Stirling, Assistant Geological Surveyor in the service of the Government, to make a thorough and systematic survey and mapping of the coal districts in the colony. This step has been taken in consequence of the suggestions of Sir James Hector, the Director of the Geological Survey of New Zealand, who, during a recent visit to Victoria, examined the supposed coal-bearing seams, and reported favourably on them. The great drawback to Victorian prosperity so far has been the absence of coal deposits.

THE *Civil and Military Gazette* of Lahore says that Mr. Dauvergne has succeeded in erecting a monument to the memory of Mr. Dalgleish, where the latter was murdered at the foot of the Karakoram Pass two years ago.

DR. A. ALCOCK, of the Indian Marine, has been deputed to examine and classify the collections which the Indian Marine Survey has made over to the Imperial Museum, Calcutta, during the past few years.

THE cultivation of the Egyptian date-palm in India is to be tried on a large scale, and an order for over 700 off-sets and three maunds of seed has been sent to Egypt. It is intended that the consignment shall be distributed in the Punjab, Bombay, Madras, Rajputana, and Coorg, for experiment.

THE *Kew Bulletin* for October opens with a paper on a valuable fibre, largely used in this country under the name of Bahia piassava. This fibre is obtained from the leaf-stalks of a Brazilian palm known as *Attalea funifera*, Mart., and is used in the making of brushes and brooms. Some interesting remarks on the condition of the industry in Brazil, by Mr. W. S. Booth, are presented in the paper. In another paper there is a letter, addressed by Mr. D. Morris to the Colonial Office, on the treatment of seedling sugar-canes at Barbados, and of any that may be found in other sugar-producing colonies in the West Indies. The remaining subjects dealt with are cinchona in Jamaica; the commercial product called gambier, used by tanners; and the fibre industry at the Bahamas.

THE *Photographic Quarterly*, if we may judge from the first number, is likely to be of great service to all who interest themselves in the study of photographic methods. It opens with a series of hints, by the Rev. T. Perkins, on the production of pictures by photography. Among the other articles are "Chemistry and Photography," by C. H. Bothamley; "The Influence of Photography on Art, and its Consequences," by A. M. Rossi; "A Plea for Photogravure," by Major J. F. Nott; "Photo-micrography," by J. Hall-Edwards; and "New Method of Printing in Clouds in Lantern Slides," by Lionel Clark. A portrait of Mr. James Glaisher, F.R.S., President of the Photographic Society of Great Britain, accompanies the first

number. There is also a view of Salisbury Cathedral from the Bishop's garden.

THE Pilot Chart of the North Atlantic Ocean for the month of October shows that September was very stormy, especially off the American coast and in the West Indies. Low barometer, accompanied by gales, prevailed along the transatlantic routes from the 4th to the 15th inclusive. The most notable disturbance was the West India hurricane, which seems to have originated east of the Windward Islands at the end of August, reaching Antigua and Martinique on September 2, and continuing with unabated force in a west-north-west direction until the 12th. The large area and the severity of this hurricane make it one of the most notable on record, and it is the subject of a special appendix, with charts, showing its behaviour over the ocean during each of ten days. The rapidity with which these charts have been published is, we believe, unequalled in maritime meteorology, and indicates, as stated in the remarks, the cordial support that the Washington Office receives from masters of vessels in its efforts to collect and utilize maritime data. There was a marked diminution of fog during the month, and an unusually large amount of ice as far as the 49th meridian, and even south of the 50th parallel.

THE appendix to the Bulletin of the New England Meteorological Society for the year 1888, shows that the number of stations constituting that weather service amounts to 172. The year was, on the whole, cool and wet, and some of the cyclones, of which 88 are classified according to the direction of their paths, were of great violence. Thunderstorms were very numerous, and in some cases destructive. A marked peculiarity of the year was the heavy rainfalls which occurred in the last six months. In the five months August to December the excess was nearly 11 inches. The greatest and least movements of the wind, as shown by anemometrical records, were in March and June respectively; the largest totals for the year were at Blue Hill Observatory.

AT the meeting of the Linnean Society of New South Wales on August 20, Mr. J. H. Maiden read an interesting paper on spinifex resin. The resin examined was a sample obtained by Mr. W. Froggatt near Derby, North-West Australia, last year, and presented by Sir William Macleay to Mr. Maiden. It is in flat cakes, about 3 inches in diameter, has a dirty bronze-green appearance, and a persistent disagreeable odour not easily described. It consists of vegetable *débris* (which may prove to belong to a grass) cemented with a yellowish-brown resin, and containing about 3 per cent. of fat. Mr. Froggatt states that it is employed by the natives as a cement for spear-heads, &c.; and the consistent testimony of the natives, as well as of the Europeans, is that it is obtained from the roots of spinifex grass (*Triodia irritans*, R.Br.). As far as the author knows, the extraction of resin from a grass has never previously been recorded. The resin isolated bears no resemblance to any other Australian resin known to the author.

A SCHEME is now being matured to establish regular training schools for surveyors in the Straits Settlements. The demand for surveyors is very great on the part both of the Government and of private individuals, and this demand is sure to increase with the rapid development of the Malay Peninsula.

TECHNICAL instruction is receiving a good deal of attention in the Central Provinces of India. Under the new scholarship rules, high school scholarships are tenable in the engineering and agricultural classes which were opened last year at Nagpore, and College scholarships have also been reserved for engineering students who desire to study in some Engineering College, or in any superior School of Forestry. At present, the classes at Nagpore are not well attended. In the engineering class, thirty

students entered, but only eleven passed the first year's course. It is, however, expected that a large number will enter during the coming session. There was an average of twenty-five students in the agricultural class. In connection with the latter class, the students are compelled to work with their own hands at all the ordinary agricultural processes, and each receives a plot of land, which he is expected to till as directed. Besides practical agriculture, the students are taught mechanical and chemical analyses of soils and practical field-surveying. Gardening and carpentry are also taught. One of the greatest hindrances to the progress of this and similar institutions in India is the dislike of the Brahmins to any manual labour; but the authorities do not despair of overcoming this difficulty.

SOME Italian observers have been recently testing the senses of criminals; and they find these duller than in the average of people. Signor Ottolenghi, in Turin, found, last year, a less acute sense of smell in criminals; and he now affirms the same for taste, which he tested by applying bitter and sweet substances (strychnine and saccharine) in dilute solution to the tongue. He finds also the taste of the habitual criminal less acute than that of the casual offender, and a slightly more acute taste in male than in female criminals. Experiments with regard to hearing were made by Signor Gradenigo (also in Turin); and of 82 criminals he found 55 (or 67·3 per cent.) to have less than the normal acuteness, the greatest inferiority being in the oldest. In female criminals the relations were somewhat better: 15 out of 28 had hearing under the average. The limits of variations in acuteness also appeared to be much wider in criminals than in normal persons. Ear disease was common. Signor Gradenigo attributes these things to bad hygienic conditions of life, and vicious habits.

MESSRS. MACMILLAN AND CO. have issued Part 2, comprising Book II., of the fifth edition of Prof. M. Foster's "Text-book of Physiology." The work has been largely revised.

THE sixth edition of the well-known "Treatise on Dynamics of a Particle," by Prof. Tait and the late Mr. W. J. Steele (Macmillan), has been issued. The work was begun by Prof. Tait and Mr. Steele towards the end of 1852, and first appeared in 1856. "At Mr. Steele's early death," says Prof. Tait in the preface, "his allotted share of the work was uncompleted, and I had to undertake the final arrangement of the whole. In the subsequent editions it has derived much benefit from revision: first by Mr. Stirling of Trinity in 1865, then by Mr. W. D. Niven of Trinity in 1871, and by Prof. Greenhill of Emmanuel in 1878. It last appeared after a general revision by myself, with the assistance of Dr. C. G. Knott and of my colleague Prof. Chrystal. The present edition has been prepared by me, with the assistance of Dr. W. Peddie."

THE second volume of the "Geological Record" for 1880-84 (inclusive) has been issued. It is edited by Mr. W. Topley, F.R.S., and Mr. C. D. Sherborn. The subjects to which the lists of publications relate are physical and applied geology, petrology, meteorites, mineralogy, mineral waters, and palæontology. There is also a division entitled "General," and another deals with maps and sections. A carefully compiled index adds to the value of the work. Mr. Topley and Mr. Sherborn appeal to editors, publishers, and authors to aid them in future labours by forwarding copies of their publications, especially pamphlets separately published, and new series.

MESSRS. DULAU AND CO. will publish, in December, a "Catalogue of British Fossil Vertebrata," by Arthur Smith Woodward and Charles Davies Sherborn. The volume will consist of about 350 pages, and will tabulate the results of researches upon the British fossil Vertebrata since the time of Linnæus. The nature of the type specimen in each case is

stated, and, whenever traceable, the museum or collection in which it is now preserved is mentioned. Special attention has been given to the distribution of the Pleistocene Mammalia.

WE have received from Napier, New Zealand, a copy of a pamphlet containing some papers on Maori folk-lore read before the Hawke's Bay Philosophical Institute by Mr. William Colenso. The first is entitled "Ancient Tide-lore and Tales of the Sea," and gives the Maori lore on the cause of the tides, on the sounding, or, as it is styled in Cornwall, the "calling," of the sea. These are followed by other Maori stories from the east coast of New Zealand, translated with explanatory notes. The whole forms one of the most charming contributions to folk-lore that have ever come under our notice.

IN his last Report to the Foreign Office on the agricultural condition of Colombia, the British Consul at Bogota says that the potato is the chief food of the people of the cold part of that country. Two principal varieties are known—namely, the criollas, which are red-skinned and orange-coloured inside, and the ordinary white potatoes. In 1865 the potato disease, which was unknown till that year, attacked the crops, and they have decreased very much in quantity since then. It is worthy of remark that the greater the altitude at which potatoes are planted (they are sometimes planted at a height of above 9000 feet on the mountains) the less tendency is there for the disease to break out, and at the greatest altitudes the disease is almost, if not quite, unknown. With regard to the cinchona industry, the Consul reports that in 1884 the Government of the Republic passed a law for the purpose of promoting the plantation of cinchona, india-rubber, and eucalyptus trees, and the President was authorized to award valuable prizes to the most successful growers of cinchona trees. The trees to be planted were to be of four species, *C. ledgeriana*, *C. officinalis*, *C. lancifolia*, and *C. pitayensis*, but, though the distribution of trees was free, the law has remained a dead letter; no new plantations have been made under its provisions.

A NEW series of experiments upon the vapour density of aluminium chloride have been made by Profs. Nilson and Pettersson, with the view of deciding the somewhat vexed question of the valency of aluminium. Former experiments of the Swedish chemists led them to the conclusion that aluminium chloride does not become completely vaporized until a temperature of about 800° C. is attained, when the density of the vapour corresponds to the formula $AlCl_3$, this value (4·6) remaining constant until over 1000° C. On the other hand, Messrs. Friedel and Crafts, employing the method of Dumas, found that between 218° and 433° C. the density remains constant at a value (9·2) corresponding to the formula Al_2Cl_6 . In order to render their experiments as unimpeachable as possible, Profs. Nilson and Pettersson have made their redeterminations at the lower temperatures by Pettersson and Ekstrand's modification of Dumas method, and have also been enabled by taking advantage of recent improvements in the construction of the Perrot furnace, to extend their observations to a white heat of 1600° C. Taking the higher temperature determinations by Victor Meyer's method first, the platinum apparatus used in the former experiments was discarded for glass and porcelain, as it has been shown that heated platinum has a slightly injurious effect upon the stability of aluminium chloride. Using glass apparatus heated in sulphur vapour (440° C.) the density was found to be 7·5. Heated still further in vapour of phosphorus pentasulphide (518°) the density diminished to 7·16. In stannous chloride vapour at 606° it became reduced to 5·34. The former results with the platinum apparatus at temperatures from 800° to 1000° showed that the density remains constant at about 4·6, corresponding to $AlCl_3$. Using the new Perrot furnace and a porcelain apparatus at 1400°, the density is still found to be not much reduced, 4·26; and at

1600°, the highest temperature attained, the value 4.08 was obtained. It therefore appears that for 600° over 1000° a very small amount of dissociation occurs, probably owing to the influence of a small platinum tube in which the chloride was introduced, as a minute quantity of an alloy of aluminium and platinum was afterwards found. Hence the molecules of AlCl_3 must be remarkably stable. The first of the experiments by the method of Dumas was conducted at the temperature of boiling nitrobenzene, 209°; at this temperature the density was 9.9. At the temperature of boiling eugenol, 250°, 9.62. At 301°, in vapour of diphenylamine, 9.55. In mercury vapour, at 357°, 9.34. In volatilized antimony tri-iodide, at 401°, 9.02; while at the temperature of boiling sulphur, the density, according to this method, had diminished to 8.79. From these results the Swedish experimenters conclude that the vapour-density of aluminium chloride decreases continuously and almost regularly up to 800°, when it becomes practically constant for four or five hundred degrees of temperature, and that although the value 9.2 is found somewhere between 200° and 400°, yet this value does not remain constant for a sufficient interval of temperature to enable us to assert the existence of molecules of the composition Al_2Cl_6 .

THE additions to the Zoological Society's Gardens during the past week include two Common Marmosets (*Hapale jacchus*) from South-East Brazil, presented by Mr. Stanley Gibson; a Canadian Beaver (*Castor canadensis*) from North America, presented by Mr. J. R. Politzer; a Palm Squirrel (*Sciurus palmarum*) from India, presented by Mr. W. Tweedie; a Green Monkey (*Cercopithecus callitrichus*) from West Africa, presented by Mrs. E. Reeves; a Centipede, presented by Dr. C. H. Bousfield; a Rhesus Monkey (*Macacus rhesus*) from India, two Black-headed Lemurs (*Lemur brunneus*) from Madagascar, two Spur-winged Geese (*Plectropterus gambensis*) from West Africa, a Red and Yellow Macaw (*Ara chloroptera*) from South America, deposited; two Black Storks (*Ciconia nigra*), European, two Manchurian Crossbills (*Crossobilia manchurica*) from Northern China, purchased; a Puma (*Felis concolor*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OBSERVATORIES.—A list of the astronomical observatories of the world, by George H. Boehmer, has just been reprinted from the Smithsonian Report for 1886 (Government Printing Office, Washington, 1889). The work is the outcome of the preliminary account published by Prof. Holden, in 1879, a large amount of material having since been collected by correspondence. The various observatories are arranged under two heads—(1) American, (2) foreign—an alphabetical arrangement being adopted in each case. References are made to 78 American and upwards of 200 foreign observatories, including private observatories. In many cases the particulars are incomplete, but it is hoped that the publication will induce the directors of observatories to communicate to the author any further accounts and corrections which they may deem desirable. Latitudes and longitudes are given in nearly every case, and also a list of past and present directors. Descriptions of the more important observatories and their instrumental equipments are given.

A SPECTROSCOPIC SURVEY OF SOUTHERN STARS.—In a private letter, Mr. R. L. J. Ellery, F.R.S., writes:—"We have been making a spectroscopic reconnaissance of southern stars with a 'Maclean' spectroscope on our 8-inch refractor as a kind of 'jackal' list for the great reflector, with which we intend to make a systematic spectroscopic survey of stars between 40° S. and the South Pole. I am sending to the Royal Astronomical Society the first list of 100 stars." This is a most important step, and fills a gap which has been a disgrace to southern science.

THE ASTRO-PHOTOGRAPHIC CONFERENCE.—The *Comptes rendus*, containing the full proceedings of the above Congress,

which met at Paris during the past month, have not yet been received. The following, however, are some of the points decided by the Permanent Committee:—

The centre of the plate is to be pointed not more than 5" distant from the selected point in the heavens, the size of the plate to be 160 millimetres square. The size of the field adopted was 2° square, whilst the *réseau* is to be 130 millimetres square, with lines 5 millimetres apart.

The amount of overlapping decided upon was 5'. Vogel has undertaken the construction and verification of the *réseau*. The distribution of the work among the co-operating Observatories has been completed, and to Greenwich is allotted that from Declination +48 to +40.

Plate glass only must be used for the plates; the chemical formula, however, is left open. The sensitiveness for the Chart and for the Catalogue is to be the same. *Réseau* to be used in both series.

A series of standard plates will be prepared by the Paris Observatory, and the time of exposure must be adjusted so as to compare properly with these standards. There will be one or more *bureaux* established for such Observatories as cannot measure their own plates.

INTERNATIONAL CONGRESS ON CELESTIAL PHOTOGRAPHY.—There was a preliminary meeting of this Congress at Meudon on September 20, to consider the programme that had been drawn up by the Provisional Committee. A few slight alterations were made in the original scheme, but the details of the work were not entered into. It was, however, decided that the greatest latitude should be allowed in the choice of instruments, and that each observer should employ that instrument to which he was accustomed, having no regard to uniformity.

In order to indicate the spectroscopic work included in the programme, a change in the style of the Congress was agreed to. It is henceforth to be the "International Congress on Celestial Photography and Spectroscopy."

A LARGE detailed drawing of the Milky Way—the result of five years' labour—is now on view at the rooms of the Royal Astronomical Society, Burlington House. An explanatory note will be read at the next (November) meeting of the Society.

ASTRONOMICAL PHENOMENA FOR THE WEEK 1889 OCTOBER 20-26.

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on October 20

Sun rises, 6h. 35m.; souths, 11h. 44m. 47.5s.; daily decrease of southing, 9.8s.; sets, 16h. 55m.; right asc. on meridian, 13h. 41.3m.; decl. 10° 31' S. Sidereal Time at Sunset, 18h. 52m.

Moon (New on October 24, 14h.) rises, 1h. 3m.; souths, 8h. 35m.; sets, 15h. 52m.; right asc. on meridian, 10h. 31.5m.; decl. 13° 56' N.

Planet.	Rises. h. m.	Souths. h. m.	Sets. h. m.	Right asc. and declination on meridian.			
				h.	m.	s.	'
Mercury..	5 42 ...	11 10 ...	16 38 ...	13	6.8	...	7 1 S.
Venus ...	3 46 ...	10 0 ...	16 14 ...	11	56.2	...	2 4 N.
Mars ...	2 42 ...	9 18 ...	15 54 ...	11	13.7	...	6 26 N.
Jupiter ...	12 24 ...	16 16 ...	20 8 ...	18	13.4	...	23 30 S.
Saturn ...	1 12 ...	8 19 ...	15 26 ...	10	15.1	...	12 14 N.
Uranus ...	6 7 ...	11 28 ...	16 49 ...	13	24.8	...	8 18 S.
Neptune..	18 26*..	2 15 ...	10 4 ...	4	9.7	...	19 19 N.

* Indicates that the rising is that of the preceding evening.

Oct.	h.	
20	...	1 ... Saturn in conjunction with and 3° 1' south of the Moon.
21	...	6 ... Mars in conjunction with and 3° 43' south of the Moon.
22	...	6 ... Venus in conjunction with and 3° 48' south of the Moon.
24	...	11 ... Mercury stationary.
24	...	19 ... Mercury at least distance from the Sun.